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Considering the magnitude of the operations, the canal was finished with promptness, owing to favourable conditions for construction and also to the ability and vigor with which the enterprise was pursued. The canal cost \$6,916,402.47,* or an average of about \$20,000 per mile. The favourable physiographic conditions in the construction of the Erie Canal are emphasized by a comparison with its principal rivals:†

	LENGTH.	HEIGHT TO ASCEND.	AVERAGE COST PER MILE IN ROUND NUMBERS.
Erie Canal.....	399	5726	\$20,000
Penna. Canals & Railroad.	399	2291	41,000
Penna. Canal, main line..	277	30,000
C. & O. Canal.....	184.5	609	60,000

The census maps showed a rapid settlement of the canal zone in the decades 1810-20, especially in the eastern part (Fig. 11). It was in the line of westward movement from New England. The fertile lands were attractive and the navigable Mohawk gave communication. A notable response to these conditions is the promptness with which the canal was utilized. From 1820 to 1825, when the canal was opened, the tolls amounted to \$577,616—this, of course, being derived only from local traffic. The sudden magnitude of these local earnings must have surprised even the promoters of the canal.

* Hulbert, Vol. II., *op. cit.*, pp. 41-72.

† Compiled from Hulbert, Vols. I and II, and Vol. IV, Tenth Census.

(*To be Continued.*)

GEOGRAPHICAL RECORD.

AFRICA.

THE DUKE OF MECKLENBURG'S EXPLORATIONS IN CENTRAL AFRICA.—Early in 1907, Adolf Friedrich, Duke of Mecklenburg, left Germany for German East Africa, to carry out surveys and make zoological, geological, ethnographical and other researches. These labours were very successful and the party has returned to Germany by way of the Congo.

The Duke's scientific assistants were Lieut. Weiss, topographer; Dr. Kirchstein, geologist; Dr. Mildbread, botanist; Dr. Czekanowski, ethnologist; Dr. Schubotz, zoologist; and Dr. von Raven, physician. The starting-point of the exploratory work was Bukoba, the German port on the west coast of Victoria Nyanza, where the Duke and his party arrived on June 9, 1907.

Installments of the Duke's report have, from time to time, been printed in the *Deutsches Kolonialblatt* and other German periodicals. On the way from Bukoba to Lake Kivu, as already mentioned in the BULLETIN, several districts, on or near the Kagera River, were surveyed and a new tributary of the river was discovered. At Lake Kivu a strong surf was noticed on the lake shore each evening, though there was no wind to account for it. It is thought the phenomenon may have some connection with the volcanicity of the region to the north. The flora of the lake and its islands was poor in species, which is in harmony with the idea of its recent origin. The studies of Dr. Kirchstein of the volcanoes north of Lake Kivu led him to conclude that their activity is dying out progressively from east to west.

An interesting excursion was made to the most westerly of these volcanoes, Namlagira, which was ascended by the Duke and several companions. It was the only volcano then in full activity. The route led over a wide lava field due to the eruption of the parasitic crater in 1904. Dr. Kirchstein in his extended researches here saw a number of eruptions from the main crater, which is some three miles in diameter. The eruptive matter consisted of ashes and lapilli accompanied by loud detonations and discharges of gas. He was able to descend a part of the inner crater wall, and discovered, on the south side of the mountain, a series of embryonic volcanoes.

Lieut. Weiss on the way to Lake Kivu made a trigonometrical and topographical survey of the region of the Kagera River; also, a large number of astronomical observations at Kissenye on Lake Kivu and a detailed survey of the region of the volcanoes. The new volcano which originated in May, 1905, near the north end of the lake, was ascended and its position and topography were determined. Dr. Schubotz, the zoologist, obtained some unexpected results, especially as regards the fauna of the Kivu and Kagera waters. *Hirudineae* and *Turbellariae* were seen in great numbers, and *Planariae*, which Stuhlmann had not found in any of the Nile tributaries, were obtained in plenty in the head streams of the Kagera, but not in Kivu. The general poverty of the fauna of this lake points to its recent origin. Traces of elephants, leopards, etc., were found on Mount Karissimbi up to 4,000 meters (over 13,000 feet), while birds were not found above 3,500 meters. The volcanoes form a marked dividing line between the regions on either side, a typical steppe fauna, remarkably rich in antelopes, making its appearance to the north. The BULLETIN has already reported (July, 1908, p. 415) the serious disaster that befell a part of the expedition on Mount Karissimbi in February last, when half of the native assistants lost their lives in a severe snowstorm.

After completing their researches in the neighbourhood of Lake Kivu, the Duke and his party went north in several detachments to Lake Albert Edward, continuing through the Semliki Valley and north along the shores of Albert Nyanza to Mahagi, whence a westward route to the Congo State stations of Kiolo and Irumu was taken. Separate expeditions were sent out here and there on one side or the other of the direct route westward. In the little-known forest of Bugoie, east of Lake Kivu, several gorillas had been secured, the first seen by a European in that district. Extraordinary quantities of game were found during the march to Lake Albert Edward on the Ruchuru plain and the zoological collections received important accessions. The buffaloes especially show certain differences from those obtained elsewhere.

From Beni, the important Congolese post in the Semliki Valley, the forest was

penetrated to the west, and its flora proved to be quite different from that hitherto seen. Some of the Monbuttu pygmies acted as guides, and though they had not before been in touch with Europeans, they were quick in taking in new ideas. Another okapi skin was obtained from the Monbuttu dwarfs. In addition to the names *okapi* (or *kwapi*) and *kenge*, which are most commonly used for the animal, the name *alabi* was also heard. A fine collection of birds was obtained and many specimens of invertebrates and fish from the Ituri, but after the river journey began at Avakubi, the fauna became much scarcer. While at Beni and the districts bordering the forest on the east, the months from February to May are wettest; in the Ituri forest the greatest precipitation is said to occur between August and October.

The scientific work of the expedition was carried on with great energy and the labours of the various experts promise to yield an unusual harvest of results.

LAKE DWELLERS OF LOWER DAHOMEY.—Surgeon-Major Gaillard, who has been studying these Africans, says (*L'Anthropologie*, Vol. XVIII, p. 99) that they do not present many analogies with the inhabitants of aquatic pile dwellings in Malaysia and New Guinea. In some cases the village in the water is opposite one of the same name on the land, and there is evidence in favour of the view that the natives were driven to build on the lake to escape the depredations of the Dahomeyans, who could not cross the water on account of the fetich customs. The lake dwellers are not especially fond of the lake habitations, and during the existing state of political security many have returned to the ordinary agriculture of the district, though still remaining fisher-folk. A large number have built ordinary land houses, but they are accused by those who remain faithful to the pile dwellings of being incapable fishermen. Fishing grounds are free to all. The miserable condition of their houses is due to a lack of forethought and a passion for tobacco and alcohol.

AMERICA.

RECENT EXPLORATIONS IN MAMMOTH CAVE.—At the Hanover, N. H., meeting of the American Association for the Advancement of Science in July last, Dr. Horace C. Hovey read a paper before Section E (Geography and Geology), in which he said that explorations in the unfrequented parts of Mammoth Cave have, in the past few years, been pushed by several visitors, especially by Messrs. Parish and Einbigler, aided by the local guides. The results were laid before Dr. Hovey who verified them by a personal visit in 1907. He found the newly discovered domes to be grander than any previously known. These additions and a number of minor corrections had led him to prepare a new guide map with an index and table of approximate distances which he had now published.

DEEP ARTESIAN WELL IN SOUTH DAKOTA.—One of the Government geologists last year informed a railroad company owning land at Edgemont in the Black Hills region of South Dakota that his study of the rock strata had convinced him that a good supply of water existed at a depth of about 3,000 feet. For many months the company, on the strength of this opinion, has been sinking a bore on its land. When the drill reached 2,980 feet water began to gush out at the rate of 350 gallons a minute. Such determinations of underground conditions are not now uncommon. Extensive areas have thus been

mapped underground by the Geological Survey and the maps have been accompanied by definite descriptions of the character and age of the different strata. The great Dakota Artesian Basin, which extends over an enormous area, has been accurately mapped, as well as many smaller but hardly less important basins.

MONEY FOR SURVEY WORK.—The appropriation in the Sundry Civil Bill for the Geological Survey to be expended during the fiscal year 1908-09, amounts to \$1,335,520. The purposes for which the larger part of the money is to be expended are: topographic surveys, \$300,000; geologic surveys, \$200,000; fuel-testing investigations, \$250,000; printing and engraving geologic maps, \$100,000; exploration of water resources, \$100,000; investigation of structural materials, \$100,000; and the *Reports* on mineral resources and Forest Reserve topographic surveys, \$75,000 each.

PLANTING TREES.—A good beginning has already been made in our country towards the wholesale tree planting that is so common in Germany, France, and some other countries. The *Forestry Quarterly* (No. 3, 1908) prints considerable information on tree planting carried out during the past season, largely by private interests. The Pennsylvania Railroad Company planted 303,030 trees. This company has in its nursery at Norrisville, Pa., 1,500,000 seedlings (walnuts, oaks, etc.) that will be suitable for field planting next spring. The Remington-Martin Co., one of the largest paper manufacturing concerns, has begun reforesting its lands and has already planted over 500,000 trees. For three years Mr. John Cole, a large landowner in the southern Adirondacks, has been replanting his lands with three-year-old white pines imported from Germany. The Gloversville Waterworks planted last spring 15,000 white and 5,000 Scotch pines and have also started seed beds. Many other companies whose names are given expect to plant largely next year. The Forest, Fish, and Game Commission has purchased eight acres of land at Salamanca, N. Y., and started 50 seed beds to raise trees for distribution to those who wish to plant land in New York State. The trees will be sold at the cost of production, about \$3.75 per thousand, the purpose being to encourage planting on the part of private owners.

WEATHER INFLUENCES PRECEDING THE EVACUATION OF BOSTON.—That weather conditions have very often been the determining control in important historical events is evidenced by very numerous examples, but little attention has thus far been paid to this subject. A contribution to this study of past weather in relation to history, by Walter N. Lacy, is published in the *Monthly Weather Review* for May, 1908, under the title, "Weather Influences Preceding the Evacuation of Boston, Mass." The writer has made a careful study of all available data of the local weather conditions at the time, and has constructed a series of four weather maps, showing the probable distribution of pressure, winds and weather on March 4-6, 1776. It appears that the Americans were favoured, during their fortification of Dorchester Heights, by smoke and fog, which kept the British from any suspicion of what Washington's men were doing, while a southwest wind carried any sounds of the American operations out toward the bay, away from the city. When the British fleet sailed to attack the fortifications, a furious southeast wind, probably produced by a marked low pressure area central in New York State, drove three of the transports ashore on Governor's Island, in Boston Harbour. The same night and the

following day torrents of rain fell, with a high southeast wind, which made it impossible for the British to land on the Dorchester shore. When the storm and surf had subsided, sufficiently for the British to attack, the American position, which had been further fortified during the storm, proved too strong to be carried, and the evacuation of Boston was decided upon. Gen. Washington's letter to Major-General Lee, on March 14, 1776, read as follows: "A very heavy storm of wind and rain frustrated their (*i. e.*, the British) design." Many studies of the kind so successfully made by Mr. Lacy are suggested by this paper.

R. DEC. W.

REPORT ON THE CLIMATE AND WEATHER OF BALTIMORE AND VICINITY.—By Oliver L. Fassig. Maryland Weather Service. Vol. 2. 4to. Baltimore: The Johns Hopkins Press, 1907. Pp. 515, Pls. XXIV., figs. 170.

We have already noted, in this BULLETIN, the appearance of two previous publications of the Maryland Weather Service dealing with the climate of Baltimore. In 1904 there was issued Part Ia, of Vol. II (pressure and temperature). In 1905 came Part Ib (humidity, precipitation, sunshine and cloudiness, winds and electrical phenomena). Now we have the complete volume, in which Parts Ia and Ib are included, together with 200 new pages on the *weather* of Baltimore. We have already pointed out that this admirable report by Dr. Fassig is the most complete and most scientific climatographic account which has been issued in this country. The portion which concerns the *weather* is fully up to the high standard of the earlier portions already published on the *climate*. Dr. Fassig has selected his weather types with care, and has illustrated them by means of a very liberal use of excellent coloured charts and of diagrams.

This is the first complete discussion of the matter of weather types, fully illustrated, for any part of the United States. For New England, some years ago, Professor W. M. Davis wrote an account, which was a pioneer along the line now followed by Dr. Fassig, but Professor Davis did not illustrate his monograph, nor did that study make any claim to be exhaustive. A few other discussions of weather types, for this or that station, have been published since then. In the *Report of the Eighth International Geographic Congress* (Washington), R. DeC. Ward urged that emphasis be laid on the cyclonic and anticyclonic units in any study of climatology, and gave an account of the thermograph and barograph curves which he had found useful in his teaching at Harvard University. Dr. Fassig has taken a long step along the line of this rational presentation of climatology. His carefully selected maps and diagrams, and his clear presentation of the results of his investigation will, it is to be hoped, serve as a model for many other studies along similar lines for other parts of the United States. To Dr. Fassig belongs the high credit of having completed a very laborious, but very valuable piece of work.

R. DEC. W.

EARTH MOVEMENTS IN THE CALIFORNIA EARTHQUAKE OF 1906.—The United States Coast Survey, previous to 1906, had done much careful triangulation in California; and since the evidence was clear that there had been horizontal movements of from 7 to 20 feet in connection with the earthquake of 1906, it became important to review these earlier triangulations to find out what

corrections were necessary. This has been done, and in connection with it some very interesting and important scientific results have been obtained, which are now published by John F. Hayford and A. L. Baldwin (*Report Coast and Geodetic Survey* for 1907, Appendix No. 3, pp. 67-104). By this new triangulation it was discovered that there had been movements not only in 1906, but, what was hitherto entirely unexpected, at an earlier period, probably during the earthquake of 1868. These two great displacements affected an area of at least 4,000 square miles.

Most of the report is concerned with a detailed statement of the methods employed in obtaining the results, and a careful analysis of the evidence of horizontal shifting as deduced from a relocation of the triangulation stations. Among the noteworthy results of this study it is found that

During the earthquake of 1868, or about that time, about 1,000 square miles of the earth's crust were permanently displaced to the northward about 1.6 meters (5.2 feet).

During the earthquake of April 18, 1906, displaced points on opposite sides of the great fault moved in opposite directions, and essentially parallel to the fault. Points to the east of the fault moved in a southerly direction, points to the west in a northerly direction. The displacements decrease in amount away from the fault.

The combined effects of the earthquakes of 1868 and 1906 have increased the distance between Mount Tamalpais and Black Mountain by 3 meters (10 feet). The distance is 79 kilometers (49 miles) and the increase is, therefore, one part in 26,000. The Golden Gate lies between these two stations. It is interesting to note that the length of part of the Pacific coast, including the Golden Gate, has been increased, just as the distance across Monterey Bay has been increased.

There has been

no change of elevation of sufficient magnitude to be detected with certainty.

The significance of such changes has important bearing not only upon geological study but upon human affairs, in various directions, and is therefore a matter of great geographical interest.

R. S. T.

DR. E. O. HOVEY'S DESCRIPTION OF MOUNT COLIMA.—In a valuable article on "Mountain Climbing in Mexico" (*The Outing Magazine*, October, 1908), Dr. E. O. Hovey gives an account of his ascent of Mount Colima and an interesting description of this little known though prominent volcano. He says:

The little mountain group known as Colima comprises two great peaks, the northern, and more extensive and massive of which is the ancient volcanic pile called the Nevado de Colima. The culminating point of the Nevado is 14,361 feet above the sea, according to the latest determinations of the Mexican geologists. From the north it presents a striking resemblance to the Matterhorn, reversed, but from the south the likeness is not so clear. The lower slopes of the mountain are covered with a heavy forest, many of the trees being of enormous size, and the wealth of air plants of many kinds, including some orchids and two kinds of cactus, arouse the interest and admiration of the traveller. One zone of vegetation after another is traversed on the way up the mountain, until, at an elevation of 10,600 feet and upward to 13,000 feet, the woods are made up of practically nothing but pine trees. Above 13,000 feet there were no trees, partly, no doubt, on account of the rocky, precipitous character of the pinnacle forming the summit of the mountain. Snow lies on the upper part of the mountain much of the year. Here and there we saw the little, square stone-walled pits in the ground in which the snow is compressed by the peons into an icy cake, which is taken to Zapotlan for sale.

The southern peak of the Colima group is the Volcán de Colima, the apex of which is 1,700 feet lower than the summit of the Nevado, and is tenth in the list of Mexico's mountains. This volcano is a constant menace to the surrounding country, according to the opinions of the inhabitants of the vicinity. Steam always rises from the summit in greater or less volume, but great eruptions have not occurred more frequently than once in sixteen or eighteen years. After a long period of quiet there was a heavy outburst in 1851, followed by others in 1869, 1885 and 1903. The eruption of 1869 seems to have been the most severe of those of recent years.

ASIA.

DR. SVEN HEDIN'S RETURN FROM TIBET.—This explorer returned to the hill town of Simla, in northern India, in September, on his way home to Europe. When he reached Gartok, in southwestern Tibet, late last year, he announced his intention to go north to the district of Ladakh, in eastern Kashmir, for the purpose of taking home those of his men who lived in that region. He would spend the winter there and in the spring would start for Peking through Chinese Turkestan or go south to India.

This, however, was not his real purpose, for he intended to make a third long journey in Western Tibet. His alleged plans were announced merely to throw the Tibetans off the track, for they were watching him closely and meant to prevent him from travelling any longer in their country. His ruse succeeded, and his third series of explorations in Tibet since he resumed his labours in Asia in August, 1906, again illustrates his remarkable endurance and unfailing resource.

His two earlier journeys may be briefly summarized: As the Indian Government forbade him to enter Tibet, he fitted out a caravan in Ladakh, in 1906, ostensibly for explorations in Chinese Turkestan, crossed the border of that country into the extreme northwestern corner of Tibet at the Aksai Chin or White Desert, explored the unknown triangular tract between the routes of Wellby, Bower and De Rhins, discovered new mountains and many fresh- and salt-water lakes, obtained further proof of the wide distribution of gold on the plateau, crossed the whole of western Tibet in a southeasterly direction, and arrived at Shigatse, on the Brahmaputra, on February 22, 1907.

A little later, he started westward through southern Tibet, with long detours to the north and south, crossing several times the great mountain range Nin-Chen-Thang, which he had discovered on his first journey and now found to extend clear across southwestern Tibet. He also discovered and examined the sources of the Brahmaputra, Indus and Sutlej rivers and, late last year, reached Gartok in the extreme western part of Tibet.

Dr. Hedin's third journey cannot yet be fully described, but a despatch to the *London Times* (weekly Edition, No. 1655), dated "Simla, Sept. 16," gives an outline of this work. A fresh caravan was organized at Leh, consisting of 11 men with 40 animals and three-months' provisions. The party started north on December 4, last year, and when within two days of the Karakoram Pass turned due east. It crossed into Tibet at Aksai Chin, in spite of great difficulties, for the weather was severe, snow fell continuously and the animals began to die. The lowest temperature -39.8° (Cent.) was registered on January 15. Dr. Hedin's feet were frost-bitten and all the sheep taken for food died. Finally, the expedition reached Shementso, aided by friendly nomad hunters, who supplied some antelope and sheep. No other sign of life had been seen for sixty-four days.

In the next march of twenty days to the east-southeast, passing Lake Lemchang, gold fields were seen, with channels for gold washing, and evidence that in the summer months, the industry is conducted on a fairly large scale between latitudes 32° and 34° .

Thus far the country had been revealed to some extent by earlier explorations, but the way ahead was in the unknown. Danger from Tibetans was increasing, and so the explorer assumed the guise of a common Ladakhi, stained his hands and face, and, when nomads were met, drove the baggage and sheep as a servant of the nominal head of the caravan, Abdul Karim, a trustworthy

man, familiar with Tibet. The observation instruments and money were hidden in bags of rice. The appearance of Ladakhis there in winter aroused suspicion, which the party lulled, as far as possible, by pretending to be the agents of a Ladakh chief who wished to buy wool in summer and to send thousands of sheep to the grazing grounds.

At Lake Tong (Tongtso), just north of latitude 32° , Dr. Sven Hedin reached the point where his earlier route and those of Littledale and Nain Singh crossed, and he thus established fresh connection with earlier mapping. He had now reached the northern edge of the great unknown tract between 30° and 32° N. Lat. After travelling east for some time, he turned due south, crossing several ranges running east and west. The nomads supplied him with food and he passed the enormous ice mountain Shakangsham, the source of a large river, on the east, travelled over the Ladang Pass and entered the Bongba province, which no European had ever seen and whose name was scarcely known.

He discovered Lake Chunitso and followed its west shore for a day. He saw caravans of sheep carrying salt and first heard of the great salt lake Tabia Tsakha, which is a source of considerable wealth to the Government, the salt being exported in large quantities to the east and south. Two more ranges were crossed, and then the open plain was reached bounded southward by the great range of the Nin-Chen-Thang, which is the grandest physical feature north of the Brahmaputra Valley. Snow and glaciers everywhere bounded the horizon. The pass through this range, called Samyela, 18,000 feet, gave approach to the watershed between central Tibet and the Brahmaputra. This was the eighth time that the explorer crossed this range at various points.

The last important piece of discovery was the solution of the problem of the Charta-Sangpo, a large tributary of the Brahmaputra, reaching it from the north. Its hypothetical mapping was found to be very inaccurate. The Charta flows from a lake that is fed by great snow peaks.

EXPANSION OF SHANGHAI.—The constant expansion of the port during 1907 was the most noticeable feature of the year. During no other period were so many important architectural works begun or completed, or so many blocks of time-honoured buildings demolished to provide space for modern structures. A bold innovation is the construction of enormous edifices entirely in reinforced concrete. The godown accommodation, which a few years ago was insufficient to meet the demands of trade, has been largely supplemented and is now more than ample for existing requirements.

Another feature of the times is the increasing linguistic proficiency of the Chinese. "Pidgin" English is falling into disuse; and the native acquires French, German, and English, spoken and written, with comparative ease, and in this accomplishment suffers nothing by comparison with his Japanese rival. The foreign trader finds it necessary to do more in the same direction, and the Chinese language is in consequence being studied by Europeans to a much greater extent than formerly. (*China. Imperial Maritime Customs, Statistical series, Nos. 3 and 4, 1907.*)

EUROPE.

A CANAL THROUGH AN ISLAND IN THE ELBE.—A canal of the width of rather more than 1,000 feet is to be constructed through the island of Mühlenwerder, in

the Elbe, where the Mühlenfeut joins the river, by which Hamburg will be enabled to use a considerable part of the island for future harbour construction, and to leave the waterway from the mouth of the Elbe to Harburg independent of Hamburg's shipping. Hamburg will, in consequence, be able to construct harbour basins independent of the part of the Elbe belonging to Prussia. The deepening and widening of the lower portion of the Elbe in 1896 resulted in the river being available for the increasing traffic and the larger dimensions of the vessels, but the improvements then made are no longer sufficient; hence the present proposal, the cost of the carrying out of which is estimated at £6,000,000. (*Nature*, No. 2028, p. 468.)

THE SCANDINAVIAN DIVIDE.—The main divide of the Scandinavian peninsula does not extend in irregular fashion, but in a series of scollops, with the convexity to the south and east. In a recent paper Prof. Reusch (*Norsk Geologisk Tidsskrift*, Bind 1, No. 1), explains this peculiarity as a result of the fact that the west-flowing streams have greater power than those flowing eastward. That this is to be expected is clear from the fact that the west-flowing streams have both a steeper slope and a greater water supply. Thus, having more energy, they are pushing their divides backwards into the drainage area of the east-flowing streams. If such is the case, instances of river piracy should be found, and a part of Prof. Reusch's paper is devoted to a statement of the evidence of this. He shows that there are a number of instances of what he calls "hook-valleys," which in American physiographic literature are known as barbed tributaries; that is, tributaries entering in an upstream direction, instead of pointing downstream as is normal.

R. S. T.

A NORWEGIAN LANDSLIDE.—Landslides in their relation to life are usually of destructive character. This is well illustrated by the landslide of January 15, 1905,* in Nordfjord, north of Bergen in Norway, recently described by Prof. Reusch (*Norges Geologiske undersøgeles Aarbog*, 1907, No. 3). A huge mass of rock, estimated to be 100 meters high and 10 meters thick, together with a still greater mass of moraine, slid bodily down the mountain, a large part of it entering Loen Lake. This gave rise to a great wave, which at one point swept to a height of over 40 meters. A steamer, drawn up on the shore for the winter, was washed a distance of 250 meters, coming to rest at a distance of 218 meters from the lake. Here the water rose 25 meters, stripping the earth and vegetation from the promontory. At the village of Bodal, where the water rose 10 meters, the lower buildings were all destroyed and 26 persons lost their lives, while at Nesdal 34 persons were killed. The isolation of the inhabitants of a Norwegian fiord is clearly and somewhat pathetically stated in the concluding sentences of Professor Reusch's English summary. He says: "Several circumstances made it difficult to bring the poor people such quick assistance as was needed. All the boats along the lake but one were destroyed. There is no road, with the exception of a difficult path, and the following day a heavy gale having sprung up, part of the path was covered with an avalanche of snow."

R. S. T.

CLIMATE OF DAVOS.—Davos has long been well known as a health resort, and the special advantages of its climate have been very generally praised. Dr. Hugo

* See the abstract of Mr. A. P. Brigham's paper in BULLETIN for 1906, p. 86.

Bach has recently issued a report on the climate of Davos (*Neue Denkschriften der Schweizerischen Naturforschenden Gesellschaft*, Bd. 43, I). The valley is well sheltered from the wind, and calms are frequent. The cloudiness, which is at a minimum in winter, is small when compared with that on the lowlands, or with that on mountain summits. The air is very dry, especially in winter. Insolation is strong. Low shade temperatures can be easily endured owing to the strong sunshine, dry air and low wind velocity. The mean annual precipitation is 36 inches, the minimum coming in winter.

R. DEC. W.

OCEANIA.

CORAL REEFS OF THE GREAT BARRIER, QUEENSLAND.—A paper under this title, read at the Adelaide meeting of the Australasian Association for the Advancement of Science in January, 1907, is a study of the structure, life distribution, and relation to the mainland physiography of the coral reefs of the Great Barrier by C. Hedley of the Australian Museum, Sydney, and T. Griffith Taylor, of the Geological Department, University of Sydney, based upon their studies in 1906 during a visit to the reefs near Cooktown. The authors present definite traverses across three reefs in various and progressive stages of growth, showing the superficial geological structure and distribution of life. These observers favour the Darwinian view of coral growth.

Summarizing the results of their studies, they show that the growth of an individual reef proceeds in a regular cycle. If the reef reaches the surface with its axis along the wind, then its shape endures; but if across the wind, then its extremities are produced backward, forming first a crescent, later a horseshoe, and finally an oval, thus enclosing a lagoon. Subsidence at this stage arrests development or rejuvenates the reef. In quiescence, the lagoon walls broaden, the lagoon is obliterated with sediment, a vegetated sand bank spreads on the summit and the atoll, grown to a cay, has arrived at maturity.

Not every writer on the Barrier Reef Region has expressed an opinion on the question of formation during subsidence. On the Darwinian side are ranged Jukes, Kent, and Andrews, and opposed to it is Agassiz. The present observers find a verdict for the Darwinian view on these grounds: That the mainland of Queensland shows subsidence in (1) drowned river mouths, (2) the formation of its bays and islands, and (3) the sinking of an isthmus that once continued the Cape York peninsula to Papua; that the sinking of the Queensland coast is part of a general movement which affected the whole of Eastern Australia and Tasmania; probably correlated with an upward movement in the Australian interior between the 135th and 140th meridians and perhaps on the north shore of the Papuan Gulf; the Barrier trough thus ending in a valley of the Fly River; that the Barrier presents (which has been denied) a steep outward face, agreeable to the Darwinian hypothesis; that ejections from the Murray volcano show coral formation to occur there at considerable depths; and that the maturity (a term here introduced into coral geology) of the northern reefs indicates slow subsidence followed by quiescence.

THE BONIN ISLANDS.—A long paper, "Pflanzengeographische Studien über die Bonin-Inseln," by H. Hattori, docent in botany at the Imperial University at Tokyo, appears in the *Journal of the College of Science in the University* (Vol. 23, Article 10). The author says the islands have their name from the Japanese "Munin-to" (uninhabited islands), but they are commonly known in Japan as "Ogasawara-shima," after their discoverer, Ogasawara Sadayori, who in 1593 was driven ashore on those islands. Many products of the islands were taken to Japan by later visitors, but the trade soon came to an end, as the coast was dangerous and many vessels were shipwrecked there. The archipelago consists

of more than twenty large and small islands and lies between $26^{\circ} 32'$ and $27^{\circ} 43'$ N. Lat. and $142^{\circ} 6'$ and $142^{\circ} 14'$ E. Long., almost in a straight line from north to south. There are in the chain three groups from north to south, in the western edge of Polynesia. The islands are covered with high and low mountain chains, their coasts are high, rugged, and deeply indented, and offer scarcely a single harbour where a ship may lie at anchor, because the rock wall falls almost precipitously to the sea. Only Futami, in the northern part of Chichi-shima in the middle group, is adapted for the anchorage of large vessels, and it is the best haven among the islands.

The Japanese long used the islands as a penal colony, but in 1861 settlers were sent to them, and in 1876 Japan established a colonial government there. All the islands are of volcanic origin, formed in the Eocene period of the Tertiary, as was shown by nummulitic enclosures. The volcanic soil favours the production of the banana, pineapples, and sugar cane, which are the chief crops. The average temperature is 22.1° C., and only in the three months from January to March does it fall a little below 20° C. The average rainfall is 1,379.9 mm., the wet period extending from June to September, and the dry season from January to April. Fifty-four pages are given to a description of the flora and its affinities with the vegetation of other island groups. The monograph is illustrated with photographs.

POLAR.

MR. LEFFINGWELL'S PLANS.—Letters received from Mr. Ernest DeKoven Leffingwell, *via* Point Barrow, announce his change of plans for the season and his early departure for San Francisco, where he will probably arrive on one of the whaling vessels about Nov. 1.

His intention was to remain another year at Flaxman Island, and supplies and dogs were forwarded by Mate Storkersen, last summer. When it became evident that his work could not be completed during the next year, he decided that it would be best to return and "refit" for a longer period. Special instruments were wanted for the work which he finds to do, and there seemed to be need of consulting the Department in Washington.

He has already explored several rivers never before seen by white men, and mapped one or two hundred miles of the coast heretofore not accurately given. His headquarters remain at Flaxman Island. His address in San Francisco, where letters may be received from him as early as Nov. 1st, is care of the Wells-Fargo Express Company.

NEWS FROM MR. STEFANSSON.—The Society has received three letters from Mr. Stefansson, the ethnologist, in which he gives particulars of the conditions this summer on the Arctic coast of America and of some changes in his plans which circumstances have necessitated. Writing from Fort McPherson (on Peel River, near the head of the Mackenzie delta), on July 15, he said that he had secured two whaleboats and a sufficient outfit of dogs and some other supplies. He and his companion, Dr. Anderson, crossed Slave Lake June 24, ten days after the ice broke into cakes, and reached Fort McPherson July 6. He intended to start July 16 with a whaleboat and one native down the delta for Herschel Island, and Dr. Anderson, meanwhile, would use the other boat along the river and coast between

Fort McPherson and Herschel Island, stopping, now and then, to make zoological collections.

The other letters, dated Herschel Island and Point Barrow, Alaska, announce unusual delay in the arrival of the whaling fleet. On Aug. 15, the whalers had not arrived at Herschel Island and it was feared they were not coming this year. The prevailing winds kept the ice hugging the coast, though there was room enough for a whaleboat along the shore.

Mr. Stefansson found that last winter was unusually mild everywhere north of Bear Lake, along the Mackenzie, but the spring was very cold, and from about Lat. 62° to the ocean Messrs. Stefansson and Anderson were never out of sight of snow-flecked mountains. The ice around Herschel did not allow ship navigation till the middle of July.

Mr. Stefansson had expected to replenish his stock of matches and obtain some other supplies from the whalers, and their non-arrival made it necessary for him to go west along the coast to Point Barrow, in the hope to secure there what he required. He started Aug. 14 by whaleboat but was picked up on the 15th by the whaler *Karluk*, which had wintered at Herschel Island, and was going home. At Flaxman Island Mr. Leffingwell came aboard to leave the Arctic, where he has now spent two years.

After reaching Point Barrow on Aug. 23, easterly winds set in, the coast was soon cleared of ice and the whaling fleet, which had been stopped at Icy Cape, 150 miles to the west, came in. Dr. Anderson and three of the natives whom Mr. Stefansson had employed, followed him towards Point Barrow with two other boats.

As circumstances had compelled Mr. Stefansson to travel far to the west, he was obliged to give up his plan of spending the coming winter among the Eskimos in Coronation Gulf, east of the Mackenzie River. But his scheme of study also included the Eskimos living inland along the Colville River to the southeast of Cape Barrow. He therefore intended to make every effort to reach these natives. He had secured at Point Barrow and from the arriving whalers four tons of supplies. Thus fitted out for two years, he expects to be able next year to act independently in case the ships again fail to penetrate Beaufort Sea. He has chartered a sailing sloop of four tons to take his supplies eastward. Storkersen, formerly mate of the *Duchess of Bedford*, has joined his party. Whether or not he may be able to reach the Colville River Eskimos and spend the approaching winter with them, he expects, in the spring, to be digging for Eskimo remains to the east of the mouth of the Colville, and Storkersen will go to Point Barrow to ship whatever specimens are collected before the party journeys east to endeavour to reach the natives of Coronation Gulf.

Mr. Stefansson also writes that hunting was very poor last winter along the coast between the Mackenzie River and Flaxman Island. The average number of deer killed per year has varied from 4,000 to 10,000, but this year probably less than 400 were slaughtered, not enough to feed the native population of about 300. Seals also were scarce, and the people might have suffered severely if the steamer *Karluk* at Herschel island had not supplied some food. There was probably no scarcity of food east of the Mackenzie, for the coast is a good food district, fish, seals, white whales, and caribou being plentiful.

NEWS FROM COMMANDER PEARY.—Mr. Herbert L. Bridgman, secretary of the Peary Arctic Club, received, late in September, a letter from Commander Peary,

written from Etah on the coast of west Greenland, a little southeast of Smith Sound. He reached Cape York, on the north side of Melville Bay, on July 31, and sent his vessel, the *Roosevelt*, on to Etah to overhaul and trim for the ice. With his attending steamer, the *Erik*, he visited a number of Eskimo settlements to obtain natives, dogs and material for his northern journey. Thirty-five walrus were killed for dog food. His party on the *Erik* rejoined the *Roosevelt* at Etah on Aug. 11. The coal supply of the *Roosevelt* was then replenished from the *Erik* and stores were landed for the relief of Dr. F. A. Cook, who had not yet returned from his northern trip. The weather was unusually stormy, but though it was snowing hard when Mr. Peary wrote, no ice had yet formed. Plenty of snow to the north could be seen from Littleton Island. The success of the journey through the Smith Sound channels depended, of course, upon the ice conditions. All on board were well.

A despatch from Captain S. W. Bartlett, commander of the *Erik*, dated "Indian Harbor, *via* Cape Race, N. F., Sept. 26," says that the *Roosevelt* left Etah for the north on Aug. 17 with good prospects. On her return voyage, the *Erik* collided with an iceberg and was badly damaged.

SUPPLIES FOR THE BRITISH ANTARCTIC EXPEDITION.—According to the *London Times*, preparations have been in hand for some time in England and New Zealand for sending supplies and equipment to Lieut. Shackleton and his comrades who spent the past Antarctic winter in McMurdo Sound, Victoria Land. It is supposed that they began their sledge journeys to the south, east, and west, early in October. The supplies were shipped from London and Liverpool to New Zealand where they will be loaded on the *Nimrod* at Lyttelton, together with meats, butter, cheese, woollen goods, etc., procured in New Zealand. The *Nimrod* will start for the Antarctic on Dec. 1. The food supplies will be sufficient for thirty-eight men for a year, and if the party is frozen in so that it cannot return home at the end of the summer's work, it will have sufficient food till a relief vessel reaches it. It is hoped that the *Nimrod* will return to Lyttelton with news from the explorers in March or April next.

VARIOUS.

A "LIST OF WORKS relating to Deep Waterways from the Great Lakes to the Atlantic Ocean with Some Other Related Works," including books, articles in periodicals, and United States documents, has been compiled under the direction of A. P. C. Griffin and issued from the Government Printing Office.

THE COAST AND GEODETIC SURVEY has just issued a supplement to its List and Catalogue of Publications covering the period, January, 1903, to Aug., 1908. The list and catalogue are now complete from 1816 to August of this year.

PROF. C. H. HITCHCOCK, of Dartmouth College, expected to leave for Hawaii on Oct. 1st. He will complete his book upon the Hawaiian volcanoes while there. The work is to be published by the Hawaiian Gazette Company of Honolulu.

A MONUMENT TO HERMANN VON WISSMANN, the German African explorer, was unveiled at Lauterberg in the Hartz Mountains early in September.

DR. A. PENCK of the University of Berlin will lecture at Yale, Harvard and Columbia Universities this winter, and will take a journey around the world at the conclusion of his work in this country.

A MAP OF THE CONGO INDEPENDENT STATE in twelve sheets, on a scale of 1:1,000,000, has just been published by Justus Perthes, Gotha.

MR. S. PERCY SMITH has translated from the French the account of Captain Dumont D'Urville's exploration of Tasman Bay, New Zealand, in 1827 and the translation has been published in the *Transactions* of the New Zealand Institute (Vol. 40, 1907).

ACCORDING TO THE *Lancet*, Prof. Krämer, senior staff-surgeon in the German navy, has been appointed to the charge of the scientific expedition now being fitted out for the Antarctic Ocean.

TO MARK THE COMPLETION of the fiftieth year of the Geologists' Association, London, in November next, it is proposed to issue a volume dealing with the geology of the districts of England and Wales visited by the Association since its foundation. The book, edited by Messrs. H. W. Monckton and R. S. Herries, and illustrated with maps and sections, will, it is hoped, be ready before the end of the year.

THE COLONIAL JOURNALS now multiplying in various parts of Africa are becoming one of the best sources of information concerning the development of these newer regions of the world. Conspicuous among them is the *Deutsch-Ostafrikanische Zeitung*, a quarto filled with information and news relating to German East Africa. It is now issued twice a week and has recently enlarged its department of commercial information, which it distinguishes from the other matter by printing it in Latin instead of German characters.

THE PRESS BULLETIN of the U. S. Geological Survey says that automobile tourists are beginning to find the topographic maps of the Survey invaluable in laying out routes of pleasure travel. Tourists have learned that public roads, as well as all important private roads, are shown on these maps, while the contour lines indicating the topography and showing the grades of the roads enable the automobilist to determine accurately the character of the country through which he intends to travel.

OBITUARY.

PROF. DR. AUREL KRAUSE.—Dr. Krause died in Gross Lichterfelde near Berlin March 11, 1908, aged 60 years. He was sent with his brother Arthur by the Bremen Geographical Society in 1881-82 to Alaska and the neighbouring peninsula of Asia for scientific exploration. His geographical reports were published

in the fourth and fifth volumes of the DEUTSCHE GEOGRAPHISCHE BLÄTTER and the results of his ethnographical studies appeared in his book "Die Tlinkit-Indianer," issued in 1885.

ENRIQUE A. S. DELACHAUX.—We regret to receive from the Museo de La Plata the announcement of the death, on the 10th of April last, of Sr. Delachaux, head-master of the School of Geography and Drawing in the Museum.

NEW MAPS.

AFRICA.

CONGO INDEPENDENT STATE.—Carte des Concessions Minières de l'État Indépendant du Congo. Scale, 1:8,000,000, or 126.2 statute miles to an inch. Supplement to *Le Mouvement Géog.*, Vol. 25, No. 32, Brussels, 1908.

Shows in colours the areas in which seven different companies have held mining concessions. Supplements an article, "Les Concessions Minières au Congo."

CONGO INDEPENDENT STATE.—Carte du Katanga. Scale, 145 miles to an inch. *Le Mouvement Géog.*, Vol. 25, No. 31, Brussels, 1908.

A black map showing railroads constructed, building, or projected, portage routes, and the areas conceded to commercial or mining companies and those which have been retroceded to the State. Illustrates a paper, "Histoire de la Découverte et de l'Occupation du Katanga de 1883 à 1908," by A. J. Wauters.

GERMAN EAST AFRICA.—Eisenbahn- und Baumwollkarte von Deutsch-Ostafrika. Scale, 1:7,000,000, or 110 statute miles to an inch. *Koloniale Zeitsch.*, Vol. 9, No. 19, Berlin, 1908.

TOGO.—Eisenbahn- und Baumwollkarte von Togo. Scale, 1:3,200,000, or 50 statute miles to an inch. *Kol. Zeitsch.*, Vol. 9, No. 19, Berlin, 1908.

These maps show railroads in operation, those in construction, or planned, areas in cotton cultivation, places where cotton is ginned, and schools where the cotton industry is taught.

TOGO.—Karte von Togo. Scale, 1:200,000, or 3.1 statute miles to an inch. Sheets, C2 (Sokodé. Second revised edition); B1 (Jendi); A1 (Sansane-Mangu). *Mitteilungen* aus d. Deutsch. Schutzg., No. 3, Berlin, 1908.

These are sheets 7, 8, and 9, of the map of Togo on the scale of 1:200,000, which is now nearing completion.

CAMEROONS.—Expedition Hassert und Thorbecke. (1) Itinerar von Abmarsch von Soppo bis zur Ankunft in Dschang. Dec., 1907--March, 1908. Scale, 10.5 statute miles to an inch. (2) Reisewege von Dschang bis Bamenda. Scale, 7.89 statute miles to an inch. *Mitt.* aus d. Deutsch. Schutzg., No. 3, Berlin, 1908.

Black sketch maps illustrating two further reports on the geographical expedition of Profs. Hassert and Thorbecke.

GOLD COAST.—Gold Coast. Scale, 1:125,000, or 1.9 statute miles to an inch. Sheets, 72-K-III (Obuasi), 72-P-IV (Prestea), 73-C. IV (Dsoje). Published